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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/670,256	09/26/2003	Hirokatsu Miyata	03500.014776.1	4904

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EXAMINER	
FLETCHER III, WILLIAM P	
ART UNIT	**PAPER NUMBER**
1762	

DATE MAILED: 05/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/670,256	MIYATA, HIROKATSU	
	Examiner	Art Unit	
	William P. Fletcher III	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 7-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7-18 and 20-22* is/are rejected.

7)☒ Claim(s) *19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 09/657,616.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/26/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The preliminary amendment filed 9/26/2003 is noted. Claims 1-4 and 7-22 are pending.

Priority

2. Acknowledgment is made of applicant's claim for foreign priority based on applications filed in Japan on 9/10/1999 (JP 11-257351) and 9/5/2000 (2000-268617). It is noted, however, that applicant has not filed a certified copy of these applications as required by 35 U.S.C. 119(b).

The examiner has carefully reviewed the record of parent application 09/657,616 and certified copies of the priority documents are lacking there as well, as indicated by the examiner in the most recent Office action in that case, mailed 3/23/2005.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: PROCESS OF FORMING A UNIAXIALLY ORIENTED MESOSTRUCTURED FILM ON A UNIAXIALLY ORIENTED POLYMER COMPOUND.

4. The use of the trademark Teflon has been noted in this application (page 11). It should be capitalized wherever it appears and be accompanied by the generic terminology. Further, the recitation of MCM-41 and FSM-16 at page 2 of the instant specification, if they are trademarks, must also be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. **Claims 1-3, 7-11, 13, 14, 16-18, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyata et al. (*Chem. Mater.* 1999, *11*, 1609-1614) in view of Okuda (JP 09-265097 A; reference is made to the attached English-language abstract and machine translation).**

With respect to independent claim 1, this reference teaches a process for producing a mesostructured film on a polymer compound-coated substrate (abstract). The alignment of the pore structure is uniaxial (page 1610, column 1, final sentence of penultimate paragraph) and elongate (i.e., rod-shaped) as shown in Fig. 2. The polymer compound is uniaxial insofar as it is rubbed to align the polymer in the same, desired direction (abstract; page 1610, penultimate paragraph; experimental section; results and discussion section, first paragraph).

This reference does not explicitly state that the polymer compound contains a sequence of two or more adjacent methylene groups in a molecular structure of the repeating unit of the polymer compound.

While this reference discloses that the polymer compound may be a polyimide, and provides an exemplary, non-methylene containing structure, it is clear that this disclosure is non-limiting and that any suitable polyimide may be utilized as the polymer compound. Okuda teaches a polyimide compound that, when coated on a substrate, may be rubbed to give a desired alignment (abstract; claim 1; and [0016]). The aromatic diamine used to produce the polyamic acid precursor of the polyimide contains several adjacent methylene groups in the principal chain (abstract; claim 1; [008]-[0016]). It is the examiner's position that inclusion of the methylene groups in the main chain of the aromatic diamine used to produce the polyamic acid precursor inherently results in the inclusion of the methylene groups in the main chain of the polyimide. Such a fact is well-known and conventional in the art of polyimide coatings (see below). Consequently, it would have been obvious to one of ordinary skill in the art to modify the process of Miyata so as to utilize, as the polyimide, the methylene group containing polyimide of Okuda. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of successfully providing an oriented polyimide coating on the substrate.

With respect to claims 2 and 3, Miyata teaches coating a polyimide precursor on a substrate, heating to convert the precursor coating to polyimide, and rubbing the coating to orient it (experimental section). It is the examiner's position that this reads on applicant's claimed step of 'preparing the polymer compound.'

With respect to claims 7-11, Miyata teaches that the mesostructured film contains silica, formed by hydrolyzing a silicon alkoxide in the presence of a quaternary alkylammonium salt surfactant (experimental section).

With respect to claims 13 and 14, Miyata teaches that the surfactant is subsequently removed by calcining (i.e., baking) (experimental section).

With respect to claim 16, Miyata teaches that the hydrolysis is performed under acidic conditions (experimental section).

With respect to claims 17 and 18, Miyata teaches that the mesostructured film is formed by simply contacting the rubbed surface of the polyimide with the mesostructure coating material solution (experimental section).

With respect to claim 20, Okuda teaches that the number of adjacent methylene groups in the principal chain of the aromatic diamine (and, by extension, the polyimide) is up to 16, which overlaps applicant's claimed range of 2 to 20. In the case where a prior art range overlaps a range disclosed by the prior art, a *prima facie* case of obviousness exists (MPEP 2144.05).

With respect to claim 21, as noted above, Okuda teaches that the methylene groups are in the principal chain of the aromatic diamine (and, by extension, the polyimide).

7. **Claims 1-3, 7-11, 13, 14, 16-18, 20, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyata et al. (*Chem. Mater.* 1999, *11*, 1609-1614) in view of Murata et al. (US 4,864,008 A).**

The teaching of Miyata is detailed above and incorporated herein again for the same reasons.

This reference does not explicitly state that the polymer compound contains a sequence of two or more adjacent methylene groups in a molecular structure of the repeating unit of the polymer compound.

While this reference discloses that the polymer compound may be a polyimide, and provides an exemplary, non-methylene containing structure, it is clear that this disclosure is non-limiting and that any suitable polyimide may be utilized as the polymer compound. Murata teaches a polyimide compound, having several adjacent methylene groups in the side chains of repeating unit of the polymer (columns 1-4). The polyimide, when coated on a substrate, may be rubbed to give a desired alignment (4:40-45). Consequently, it would have been obvious to one of ordinary skill in the art to modify the process of Miyata so as to utilize, as the polyimide, the methylene group containing polyimide of Murata. One of ordinary skill in the art would have been motivated to do so by the desire and expectation of successfully providing an oriented polyimide coating on the substrate.

Claims 2, 3, 7-11, 13, 14, and 16-18 are rejected for the same reasons as detailed above.

With respect to claim 20, Murata teaches as few as 5-10 and as many as 25 or more adjacent carbon atoms in the side chains, which is a teaching of about the same number of methylene groups (3:35-4:45). This range encompasses and/or overlaps applicant's claimed range of 2 to 20. In the case where a prior art range overlaps or lies within a range disclosed by the prior art, a *prima facie* case of obviousness exists (MPEP 2144.05).

With respect to claim 22, as noted above, Murata teaches that the methylene groups are in side chains of the repeating unit of the polymer.

8. **Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyata et al. (*Chem. Mater.* 1999, *11*, 1609-1614) in view of Okuda (JP 09-265097 A; reference is made to the attached English-language abstract and machine translation), as applied to claim 2 above, further in view of Konuma et al. (US 5,827,448 A).**

The teaching of Miyata in view of Okuda is detailed above.

While Miyata teaches that the polymer coating may be applied to the substrate by spin coating, it is clear that this disclosure is non-limiting and that any suitable means may be utilized to coat the polymer compound.

Konuma teaches that a polyimide coating, applied to a substrate as a precursor, reduced to a polyimide, and subsequently oriented by rubbing — as taught by both Miyata and Okuda — may be applied to the substrate in precursor form as a Langmuir-Blodgett film. Consequently, it would have been obvious to one of ordinary skill in the art to modify the process of Miyata in view of Okuda so as to apply the polyimide precursor to the substrate as a Langmuir-Blodgett film, as disclosed by Konuma. One of ordinary skill in the world would have been motivated to do so by the desire and expectation of successfully providing the polymer coating on the substrate.

9. **Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyata et al. (*Chem. Mater.* 1999, *11*, 1609-1614) in view of Okuda (JP 09-265097 A; reference is made to the attached English-language abstract and machine translation) or, in the alternative, unpatentable over Miyata et al. in view of Murata et al. (US 4,864,008 A), either as applied to claim 10 above, further in view of Pinnavaia et al. (US 5,622,684 A).**

The combined teaching of Miyata in view of Okuda and the combined teaching of Miyata in view of Murata are detailed above. As noted, Miyata specifically teaches that the surfactant is a quaternary alkylammonium salt (i.e., an ionic surfactant).

None of the cited references teaches that the surfactant contains a polyethylene oxide as the hydrophilic group.

Pinnavaia teaches that, in a process of forming an inorganic oxide mesostructured film, a surfactant having polyethylene oxide as the hydrophilic group is preferable to a quaternary alkylammonium salt because the former releases environmentally friendly water and carbon dioxide gas during calcination, while the latter releases noxious NO_x gases (9:43-56).

Consequently, it would have been obvious to one of ordinary skill in the art to modify either of the processes of Miyata in view of Okuda or Miyata in view of Murata to utilize, as the surfactant, a surfactant having polyethylene oxide as the hydrophilic group. One of ordinary skill in the art would have been motivated to do so because Pinnavaia disclosed that such a surfactant advantageously releases more environmentally friendly gases upon calcination.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyata et al. (*Chem. Mater.* 1999, *11*, 1609-1614) in view of Okuda (JP 09-265097 A; reference is made to the attached English-language abstract and machine translation) or, in the alternative, unpatentable over Miyata et al. in view of Murata et al. (US 4,864,008 A), either as applied to claim 10 above, further in view of Pinnavaia et al. (WO 99/57061 A1).

The combined teaching of Miyata in view of Okuda and the combined teaching of Miyata in view of Murata are detailed above. As noted, Miyata specifically teaches that the surfactant is removed by calcination.

None of the cited references teaches that the surfactant is removed by solvent extraction.

Pinnavaia teaches that, in a process of forming an inorganic oxide mesostructured film, the surfactant may equivalently be removed by calcination or solvent extraction (abstract).

Consequently, it would have been obvious to one of ordinary skill in the art to modify either of the processes of Miyata in view of Okuda or Miyata in view of Murata to remove the

surfactant by, instead of calcination, solvent extraction. One of ordinary skill in the art would have been motivated to do so because Pinnavaia disclosed that both are equivalent means for surfactant removal.

Double Patenting

10. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

11. **Claims 1 and 14 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 12 and 14 of copending Application No. 10/623,561 (published as US 2005/0019547 A1).** Although the conflicting claims are not identical, they are not patentably distinct from each other.

Copending claims 12 and 14 teach all of the limitations of instant claims 1 and 14 except that: (i) the polymer film contains a sequence of two or more adjacent methylene groups in a molecular structure of the repeating unit of the polymer compound; and (ii) the polymer film is uniaxially oriented.

With respect to (i), the copending application explicitly discloses an embodiment in which the polymer film contains a sequence of two or more adjacent methylene groups in a molecular structure of the repeating unit of the polymer compound (see the structure between

paragraphs [0080] and [0081]). Consequently, it would have been obvious to one of ordinary skill in the art to utilize, as the polymer compound in copending claim 12, the explicitly disclosed example of this compound, with the expectation of successfully providing the polymer film.

With respect to (ii), the copending application explicitly discloses an embodiment in which the polymer film is rubbed to align the polymer film in the same direction (see Example I). Consequently, it would have been obvious to one of ordinary skill in the art to utilize, as the polymer film, the explicitly disclosed uniaxially oriented polymer film, with the expectation of successfully providing a polymer film capable of controlling the orientation of the tubular mesopores.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Allowable Subject Matter

12. Claim 19 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter: Miyata teaches growth of the mesostructured pores parallel to the direction of rubbing (results and discussion section, first paragraph). The prior art neither teaches nor suggests rubbing in a direction perpendicular to the growth of the mesostructured pores.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The entry for 'polyimide' from Alger's *Polymer Science Dictionary*, is cited solely in support of the examiner's position that inclusion of methylene groups in the main chain of the aromatic diamine inherently results in inclusion of the methylene groups in the main chain of the resultant polyimide.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William P. Fletcher III whose telephone number is (571) 272-1419. The examiner can normally be reached on Monday through Friday, 9 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

5/4/2005

William Phillip Fletcher III
Patent Examiner, USPTO
Art Unit 1762